



## Original article

# A randomised controlled study examining the short-term effects of Strain–Counterstrain treatment on quantitative sensory measures at digitally tender points in the low back

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## ABSTRACT

Strain–Counterstrain (SCS) intervention has been claimed to elicit immediate and sustained reductions in tenderness at digitally tender points (DTPs), however, there is little experimental evidence to support this. Twenty-eight volunteer participants with low back pain – LBP (17 females and 11 males with mean [SD] age of 39.2 [11.1] and Oswestry disability index of 15.7 [8.6]) participated in this controlled, within-participants study of the immediate and short-term effects of SCS intervention, on pressure pain threshold (PPT) electrical detection threshold (EDT) and electrical pain threshold (EPT) at DTPs in the low back region. Immediate increases in PPT at DTPs were found following all interventions; control intervention: 30.7 kPa [CI 95% – 3.3–64.8] ( $p = 0.041$ ), sham-SCS intervention: 48.2 kPa [CI 95% 14.8–81.7] ( $p = 0.008$ ) and SCS intervention: 93.4 kPa [CI 95% 60.0–126.9] ( $p < 0.0001$ ). Results suggest that SCS intervention does elicit an immediate quantifiable reduction in tenderness at DTPs but that some of this reduction is attributable to the manual-contact component of the treatment. Increases in PPT at DTPs following SCS intervention did not appear to be maintained between 24 and 96 h after treatment. A further finding was that the control intervention elicited significant increases in both EDT ( $p = 0.044$ ) and EPT ( $p = 0.026$ ). The explanation for these findings is unclear.

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## 1. Introduction

In assessment of musculoskeletal conditions, physiotherapists routinely identify digitally tender points (DTPs) in superficial tissue (Jones et al., 1995; Simons et al., 1999; Henriksson, 2003) although the significance of these points for assessment and treatment is controversial (Lewis et al., 2008). One manual therapy technique, in which DTPs are used, is Strain–Counterstrain (SCS). This technique involves passive body positioning, which is claimed to elicit immediate and prolonged reductions in tenderness at DTPs and to reduce pain and dysfunction associated with musculoskeletal conditions (Kusunose, 1993; Jones et al., 1995). Recent studies, using pressure pain threshold (PPT) measures to quantify mechanical hyperalgesia or ‘tenderness’, have suggested that SCS treatment may elicit immediate reductions in tenderness at DTPs (Meseguer et al., 2006; Ibanez–García et al., 2009), although a weakness of these studies was that comparative sham-SCS interventions were not provided. DTPs identified using the SCS assessment procedures have been shown to

demonstrate lower electrical detection threshold (EDT) and electrical pain threshold (EPT) than contralateral non-tender control points and since electrical stimulation is proposed to bypass receptor transducers (Arendt–Nielsen et al., 2001; Graven–Nielsen and Mense, 2001) and directly activate A $\beta$  fibres at detection intensity (Collins et al., 1960; Sang et al., 2003), it has been suggested that there may be altered central processing of A $\beta$  afferents with receptor terminals at DTPs (Lewis et al., 2010).

The aim of this study was to investigate the immediate and short-term effects of SCS intervention on the sensory characteristics of DTPs identified in the low backs of participants with low back pain (LBP). In view of our earlier findings (Lewis et al., 2010), sensory measures of EDT, EPT and pressure pain threshold (PPT) were selected for use in this study. It was hypothesised that the SCS intervention would elicit reductions in PPT, EDT and EPT that would not be seen following sham-SCS and control interventions.

## 2. Methods

The study gained ethical clearance by the institutional Medical Research Ethics Committee. A randomised, placebo-controlled,

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within-participants design was used to examine for immediate and short-term changes, resulting from SCS intervention, on QST measures at DTPs in 28 participants with LBP (Fig. 1).

### 2.1. Subjects

Thirty-nine individuals volunteered for the study. Nine of these were found not to have the minimum requirement of two DTPs at the sites assessed. Two participants withdrew after their initial intervention, stating that work commitments prevented them from participating further. Participants were currently experiencing LBP as defined by the International Association for the Study of Pain (Merskey and Bogduk, 1994). They were included regardless of whether symptoms were unilateral or bilateral, chronicity of symptoms, presence of leg pain or medications taken. They met the following selection criteria: between 18 and 65 years of age, able to lie prone, having two or more DTPs identified at lower back sites according to SCS procedures. Participants had no history of spinal fractures or surgery and had not been diagnosed with an inflammatory disorder or with fibromyalgia syndrome.

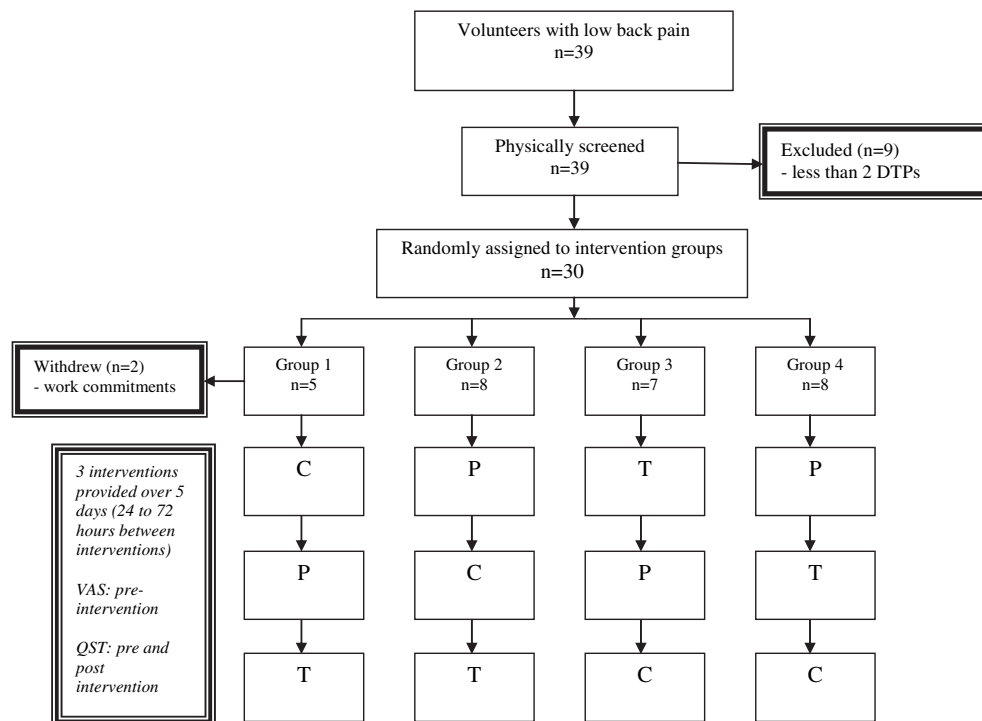
### 2.2. Procedures

Prior to the initial intervention session, participants gave informed consent and completed the 'General Health Questionnaire-28' (GHQ-28) (Goldberg, 1978) and the 'Oswestry Disability Questionnaire' (OSW) (Fritz and Irrgang, 2001) and illustrated their

pain regions on a body-chart. Prior to each of the three intervention sessions they provided visual analogue scores (VAS) for pain. Participants were randomly assigned to one of 4 treatment groups. All participants received SCS intervention (T), sham-SCS intervention (P) and control intervention (C) with the order of these interventions varied between groups. Participants attended on 3 occasions over 5 days with QST measurements taken before and after interventions (Fig. 1).

#### 2.2.1. Determining test sites

Assessment for the presence of DTPs entailed palpation with either the thumb or index finger with pressure directed in the prescribed direction (Jones et al., 1995) (Kusunose and Wendorff, 1990) at potential sites (Fig. 2). The two DTPs considered most tender by the experimenter, according to subjective feedback from the participant were marked with indelible ink. One DTP was marked for repeated PPT measures and the other for electrical threshold measures. All sites were considered suitable for electrical threshold measures however some sites were considered unsuitable for PPT measures. For example, if the DTP was over a bony prominence, such as the tip of a spinous process, or if the direction of pressure application was not directly posterior to anterior, the DTP was considered unsuitable for PPT measures. When both of the most-tender DTP sites were considered unsuitable for PPT measures, another DTP that was not over a bony prominence and identified with posterior to anterior pressure was selected for PPT measures. If both DTP sites were



#### Legend:

C: control intervention  
P: sham-SCS intervention (placebo)  
T: SCS intervention  
DTPs: digitally tender points  
VAS: visual analogue scale for pain  
QST: quantitative sensory testing

Fig. 1. Illustration of study design.

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